

Exchange Content Modeling

Modules Roadmap: You Are Here

NIEM Overview

IEPD Concepts

How NIEM uses XML (pt. 1)

How NIEM uses XML (pt. 2)

Business Skills



Exchange Content Modeling

Mapping

Subsets

Extension and Exchange
Schemas

Packaging and Distribution

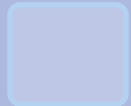
Implementation
Considerations

Objectives Roadmap

This module supports the following course objectives:



Describe what NIEM is.



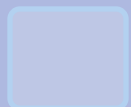
Describe what an IEPD is.



Comprehend artifacts included in an IEPD.



Develop artifacts included in an IEPD.



Package an IEPD.



Understand advanced XML concepts, as required by NIEM.

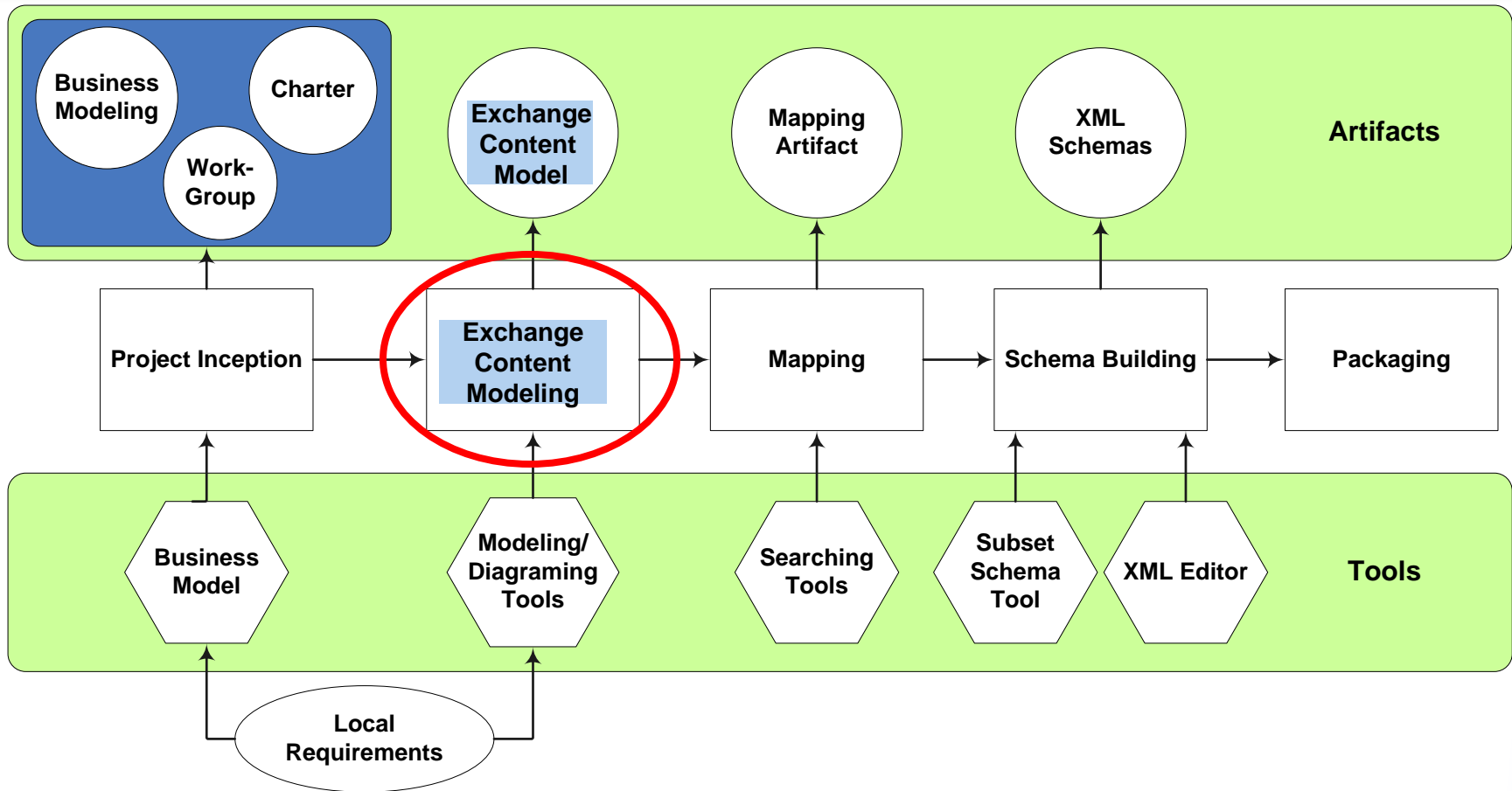


Recognize business skills required to successfully participate in an IEPD development project.

Module Objectives

- After completing this module, you should be able to:
 - ◆ Explain the role of Exchange Content Modeling in the IEPD process.
 - ◆ Recognize how to apply business skills to the modeling process.
 - ◆ Leverage proper modeling techniques.
 - ◆ Develop an exchange content model using UML.

Where are we now?



Purpose of Modeling

- Achieve a formal and precise definition of exchange content.
- Produce an artifact that is universally understood and verifiable.
- Build consensus among exchange stakeholders.
- Create a model, representing business content, that will be mapped to NIEM.

What does it look like?

- It's up to you (stakeholders).
- Unified Modeling Language (UML) is commonly used.
- Remember: it is important to take time to specify the model in a formal and explicit manner.
 - ◆ Allows for universal understanding.
 - ◆ Facilitates modeling/incorporating changes in business requirements.
 - ◆ Minimizes subjective interpretation.

Discussion Point

- How many folks have experience with UML?

Guidelines for Good Modeling

- **Cohesion** – each class should represent only one concept.
- **Completeness** – the model should accommodate all data requirements.
- **Non-redundancy** – the same concept should not be modeled more than once.
- **Enforcement of Business Rules** – the model should accurately reflect and enforce business rules where possible.
- **Communication** – the model should serve as an effective tool that supports communication among stakeholders.

UML

- Unified Modeling Language.
- Standardized modeling language that can be represented graphically.
- For the sake of the IEPD process, we are concerned with Static Structure Class Diagrams.

For Consideration

- Your model will be mapped to an object-oriented data model, so producing an OO model is ideal.
- NIEM theory can be a useful source of modeling concepts.
 - ◆ Roles, Associations, Metadata, etc.
- UML can produce OO models and can integrate with NIEM tools, so UML is a good choice.
- UML can be slow in group settings.

Further Consideration

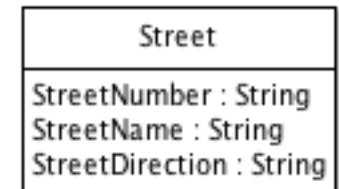
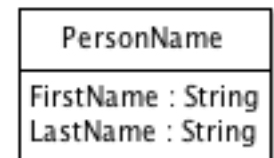
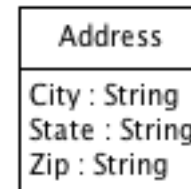
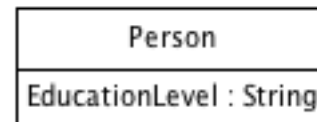
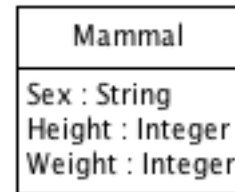
- Model real-world, cohesive concepts.
- Maintain semantic integrity of business concepts.
- Build a model that all stakeholders can understand and agree to.
- An experienced facilitator may assist in building consensus and developing a model.

UML and XMI

- **XML Metadata Interchange (XMI)** – an XML-based interchange format for UML models.
- Open standard facilitates sharing and integration of models.
- Many versions of XMI exist.
- Current NIEM tool suite is based on XMI 1.2.
- Stylesheets can be used to transform a model in one version of XMI to another.

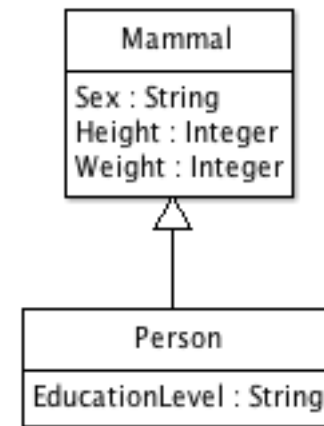
UML: Class and Attribute

- **Class** – represents a cohesive, real-world object (noun) and the structure of that object.
- **Attribute** – characteristic or defining property of a class.
- What are the classes and attributes here?



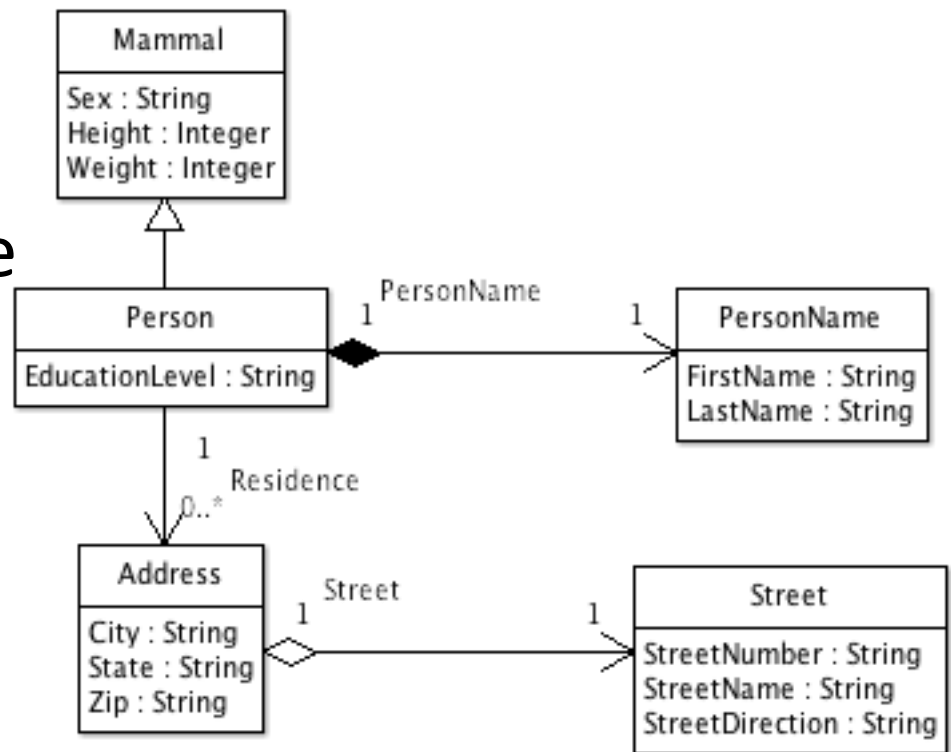
UML: Generalization

- **Generalization** – indicates inheritance from a general object to a more specific version of that object. Indicated by a closed-end arrow.
- Where does generalization occur here?



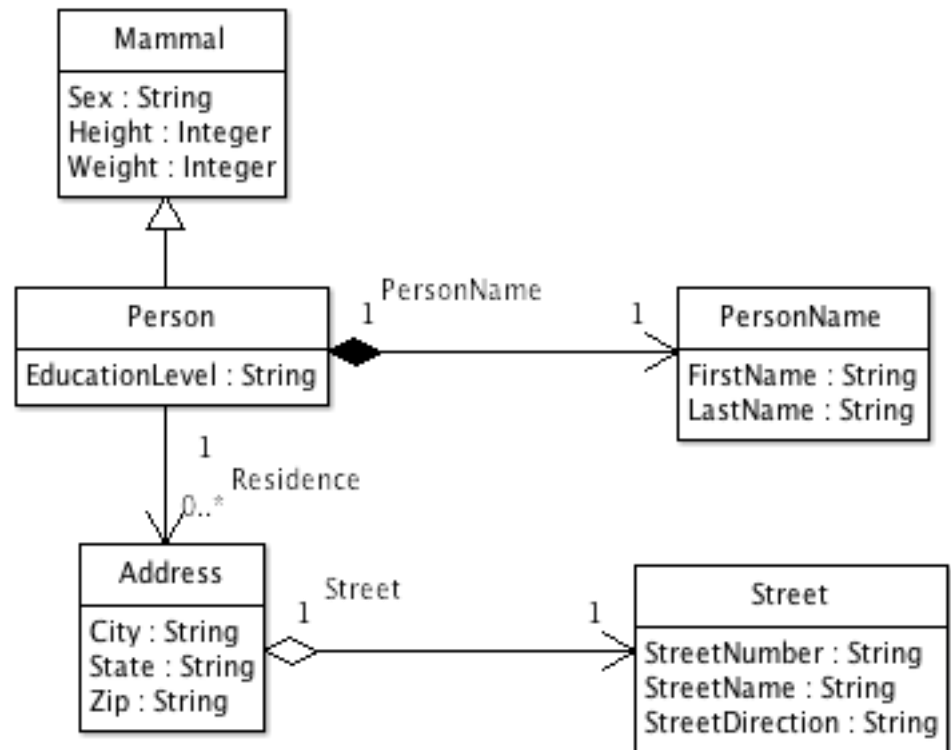
UML: Composition

- **Composition** – one class contains another class. The contained class does not have a life outside the association. This is indicated by an arrow with a filled diamond.
- What is the composition association here?



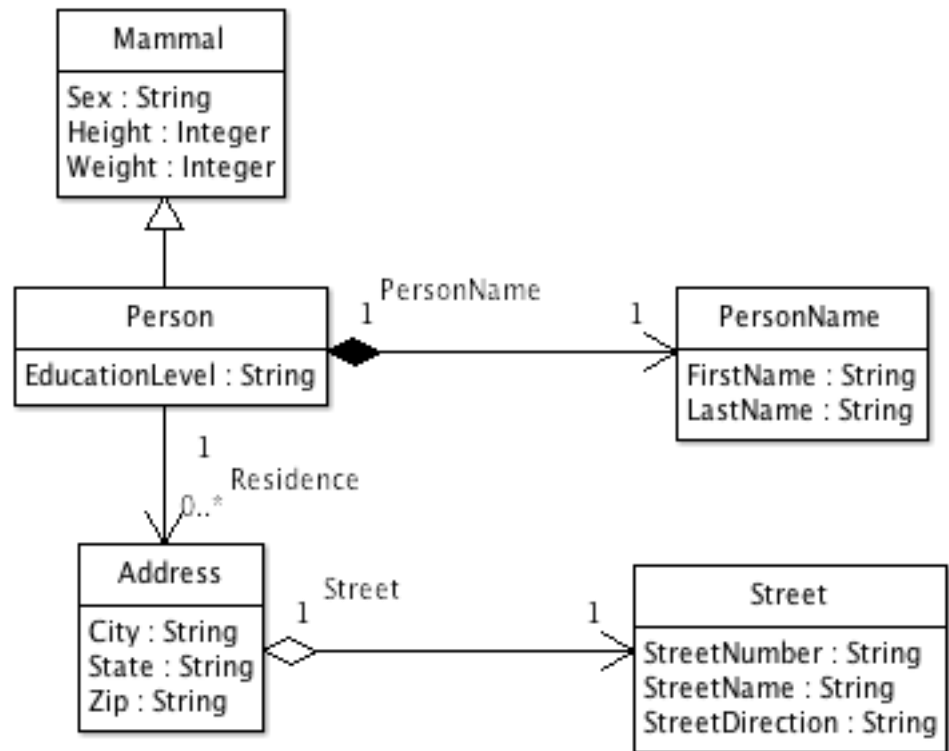
UML: Association

- **Association** – generic relationship between classes, indicated by a unidirectional arrow
- What is the generic association here?



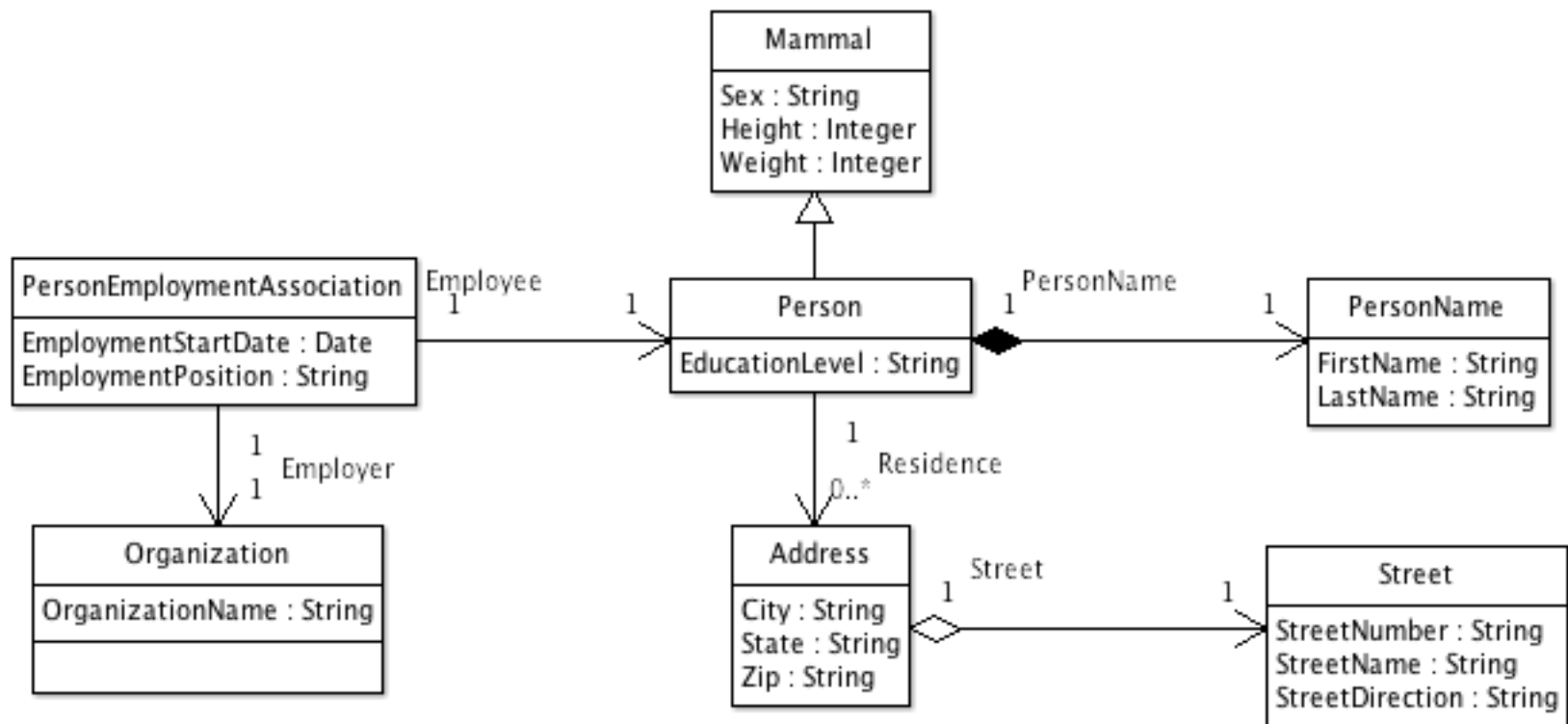
UML: Aggregation

- **Aggregation** – indicates a whole-part relationship. Aggregated classes have their own existence outside of the association. This is indicated by an arrow with a hollow diamond.
- What is the aggregation association here?



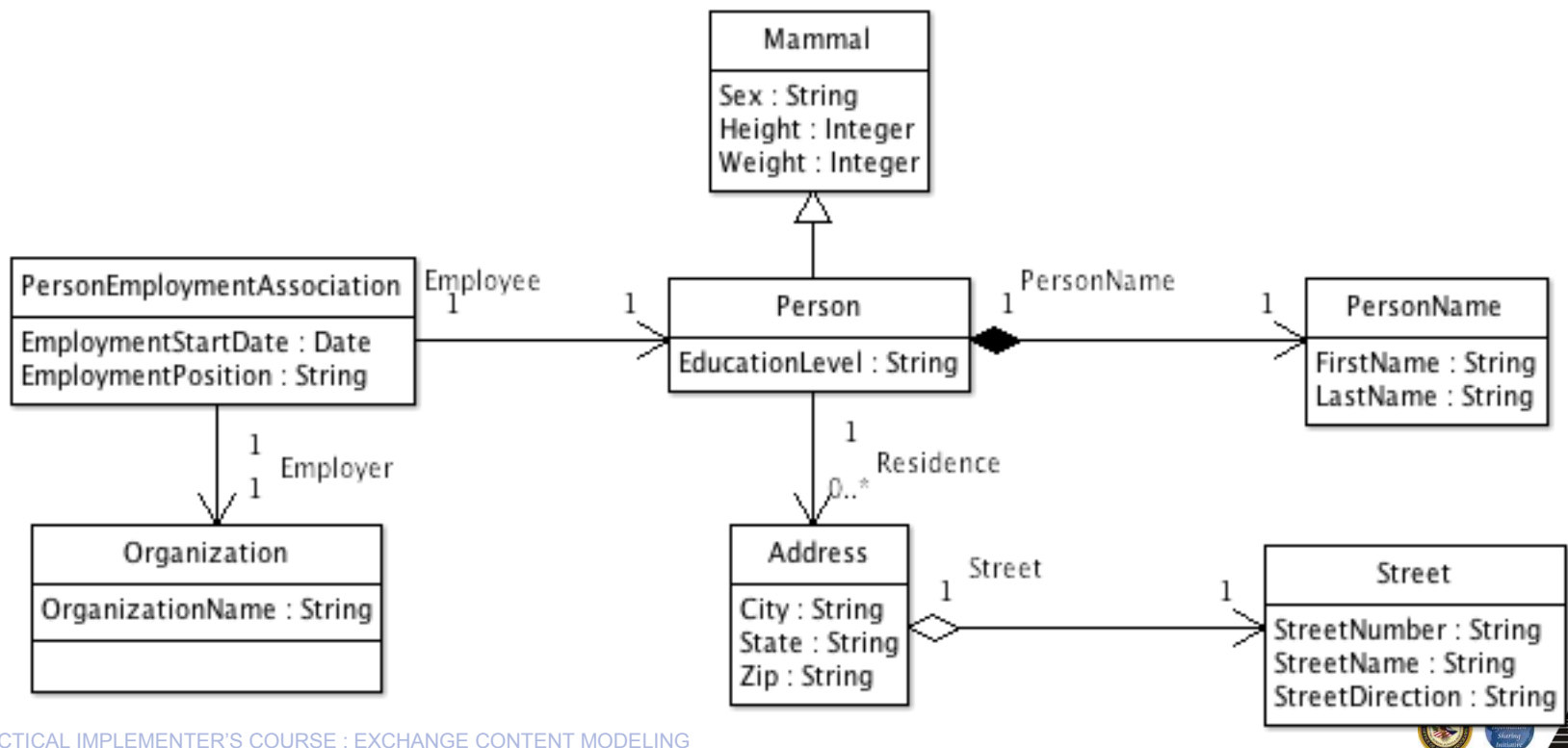
UML: Association Class

- **Association Class** – maintains information about the relationship itself. This is also a way to indicate **n-ary** associations.
- What is the association class here?



UML: Cardinality

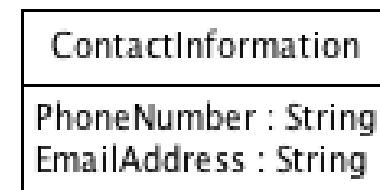
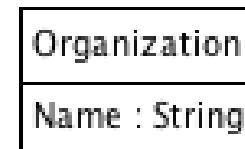
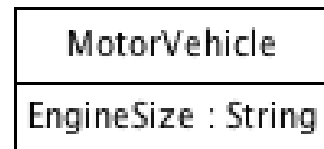
- **Cardinality** – documents quantitative aspects of associations; how many of one thing associates to another. Indicated by 0,1, or *
- What cardinality is shown here?



Exercise 13.1: UML – Class and Attribute

- Using UML, model the following requirements:
 - ♦ A “motor vehicle” has a property called **engine size**.
 - ♦ An “organization” has a property called **name**.
 - ♦ “Contact information” has properties called **phone number** and **e-mail address**.

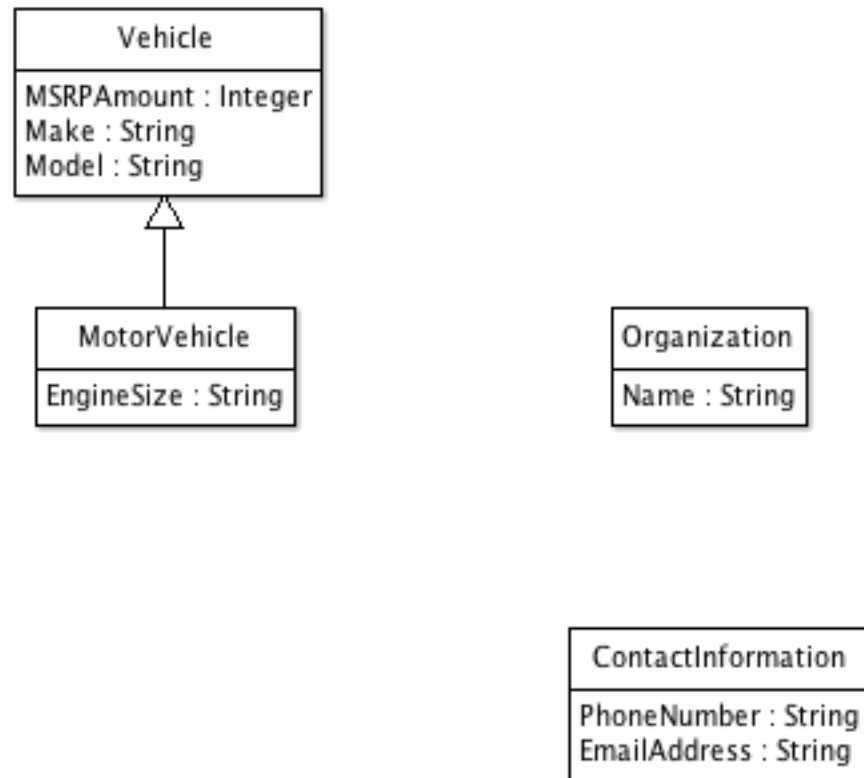
Solution 13.1: UML – Class and Attribute



Exercise 13.2: UML – Generalization

- Using UML, model the following requirements:
 - ♦ A “vehicle” has properties called **MSRP amount**, **make**, and **model**.
 - ♦ A “motor vehicle” is a special **type** of “vehicle.”

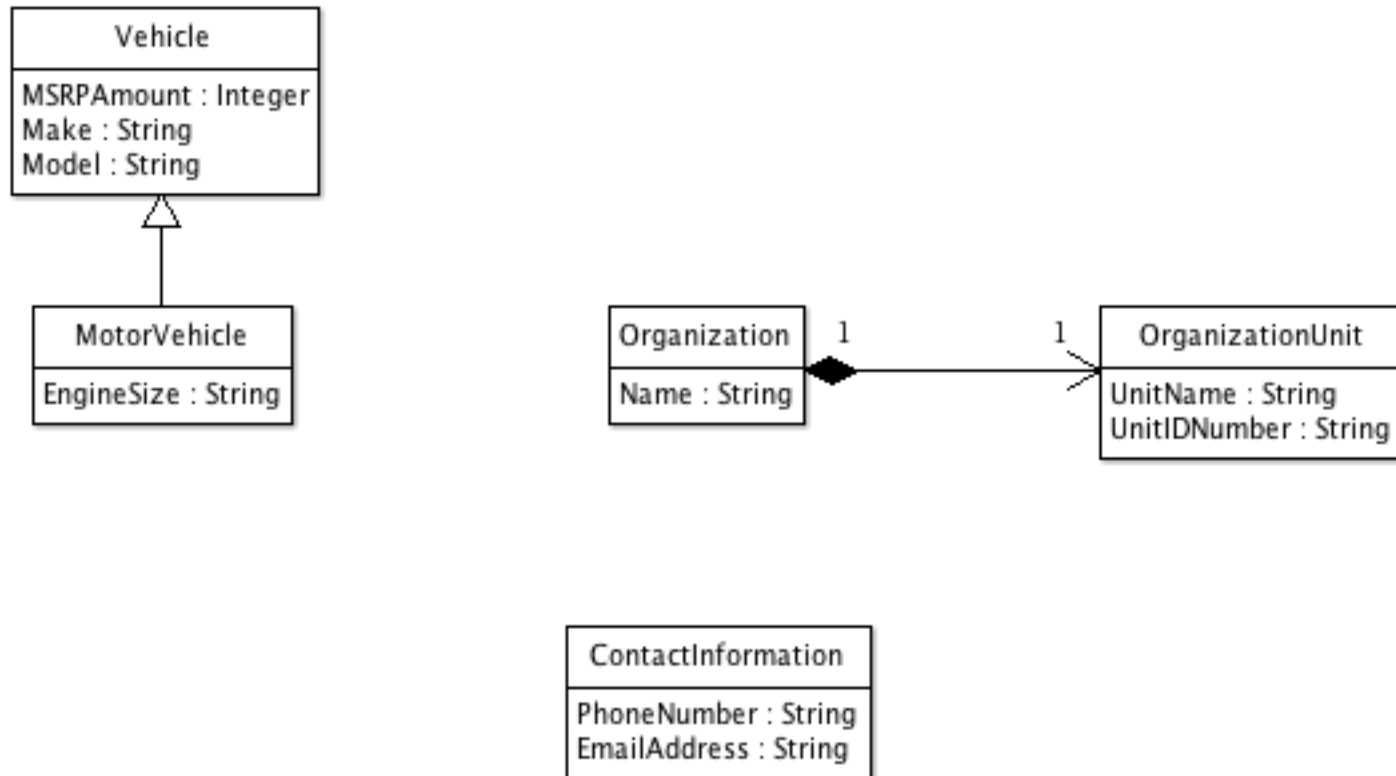
Solution 13.2: UML - Generalization



Exercise 13.3: UML – Composition

- Using UML, model the following requirements:
 - ◆ An organization has an organization unit, and organizational unit consists of **unit name** and **unit identification number**.
 - Note: an organizational unit cannot exist without an organization

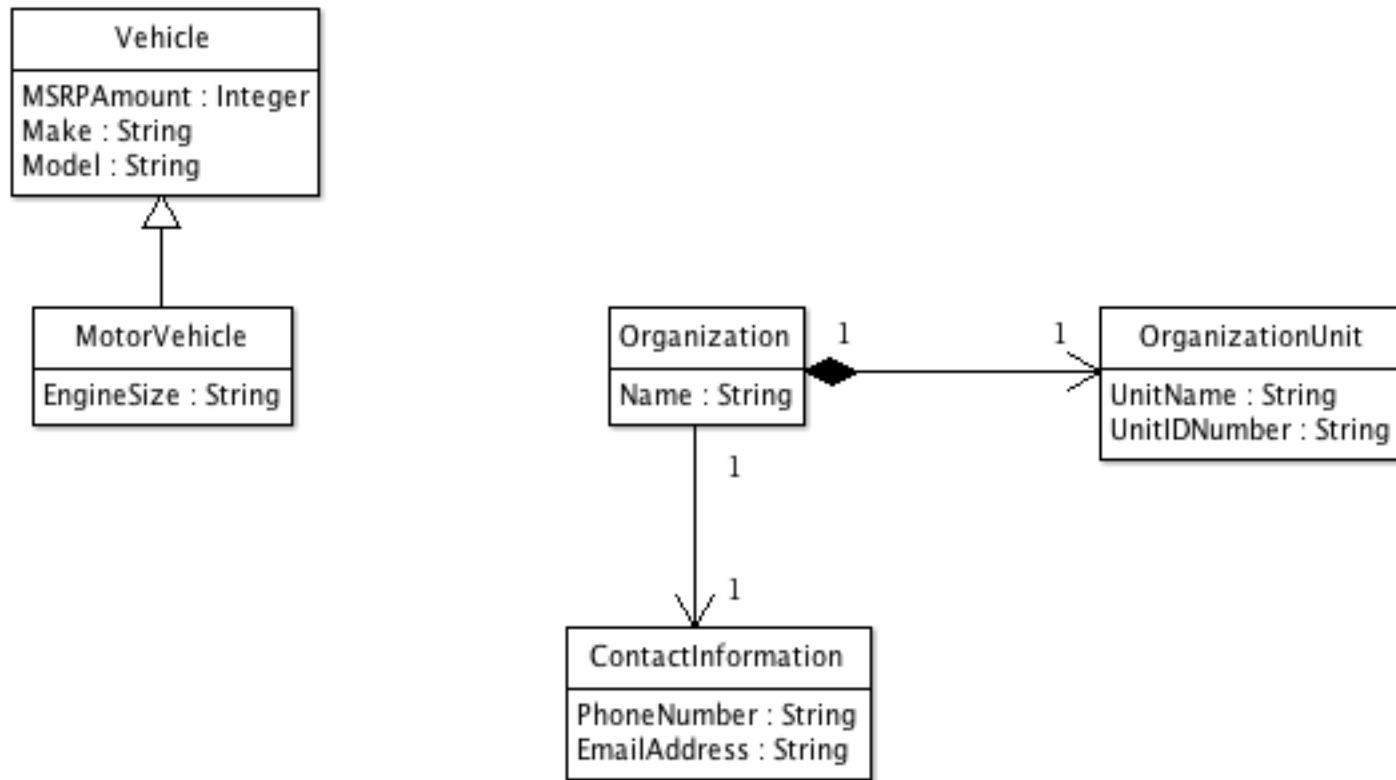
Solution 13.3: UML – Composition



Exercise 13.4: UML – Association

- Using UML, model the following requirements:
 - ♦ An **organization** is associated to a set of **contact information**.

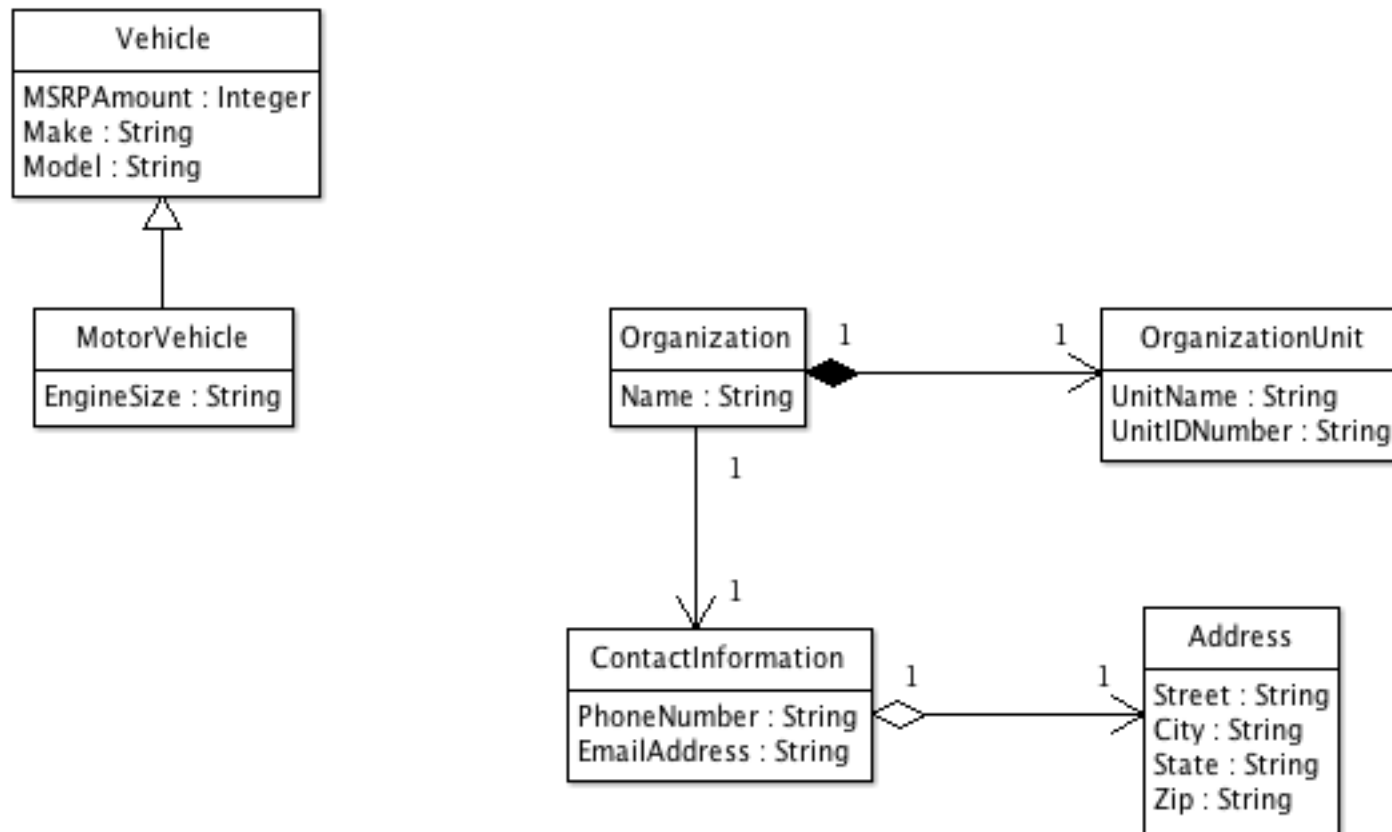
Solution 13.4: UML – Association



Exercise 13.5: UML – Aggregation

- Using UML, model the following requirements:
 - ◆ Contact information has an **Address**. An address consists of **street**, **city**, **state**, and **zip code**.
 - Note: an Address can be used outside of contact information

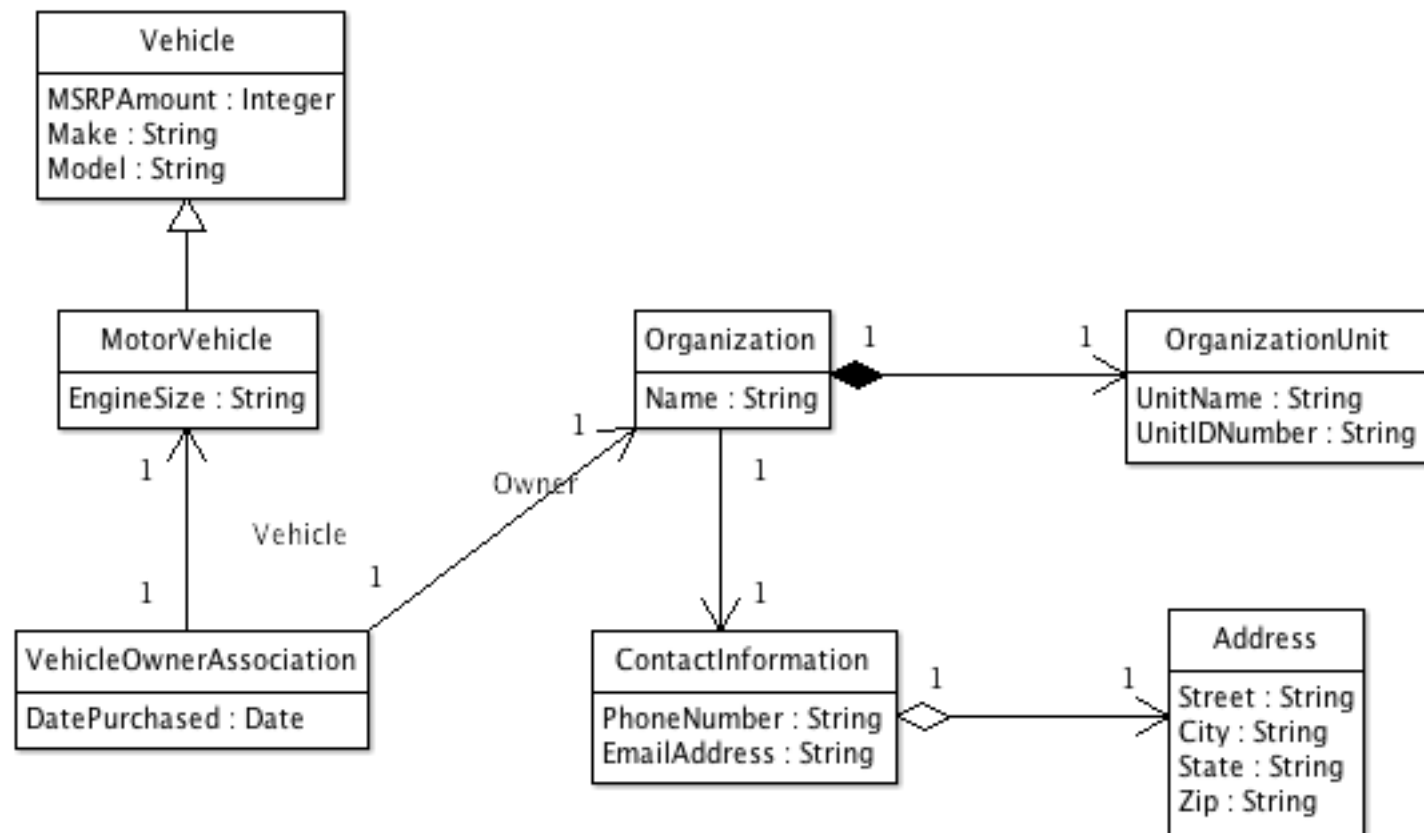
Solution 13.5: UML – Aggregation



Exercise 13.6: UML – Association Class

- Using UML, model the following requirements:
 - ♦ An **organization** owns a **motor vehicle**. It is important to know **date of purchase**.

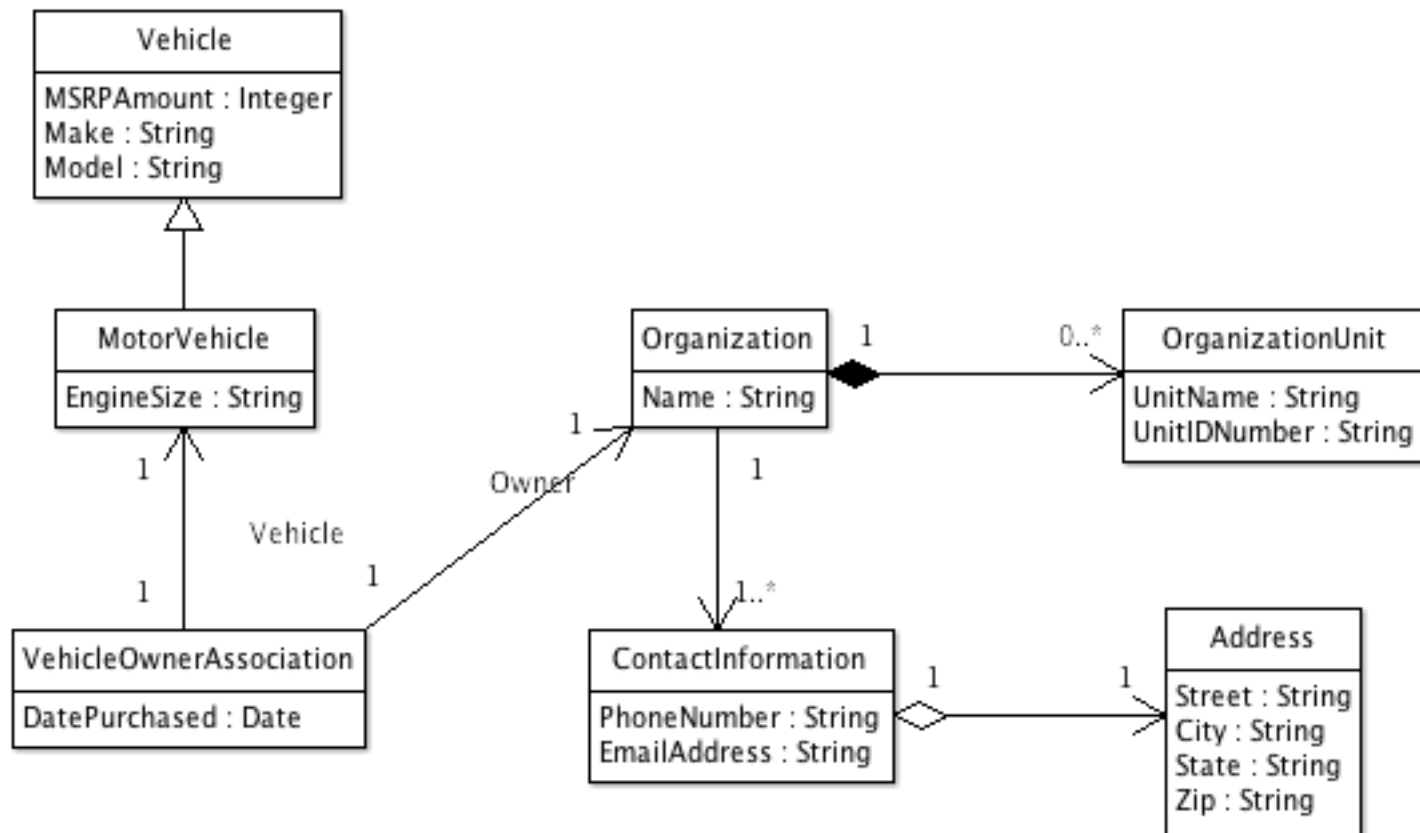
Solution 13.6: UML – Association Class



Exercise 13.7: UML – Cardinality

- Using UML, model the following requirements:
 - ♦ An organization can have zero to many organization units.
 - ♦ Each organization must have at least one set of contact information.
 - ♦ A set of contact information can have only one address.

Solution 13.7: UML – Cardinality



Case Study

NIEM Practical Implementer's Course

Case Study

- Sample Citation Form
 - ◆ Sample Citation Form will be used as the basis for the Case Study throughout this course



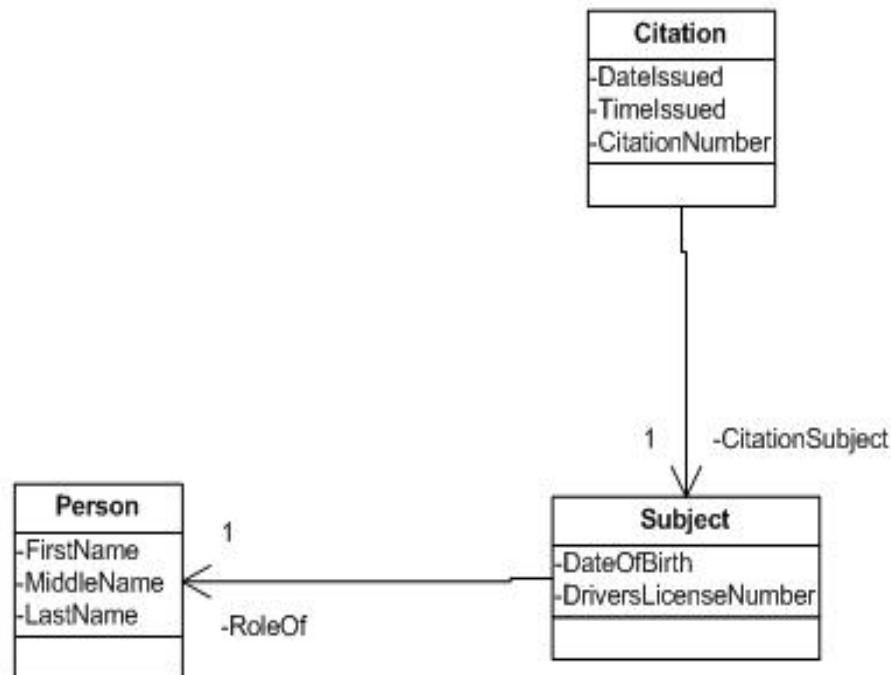
CitationFormSample.html

Case Study

- Exchange Model Exercise
 - ◆ Use the Sample Citation Form from the previous slide
 - ◆ Create an Exchange Model using UML

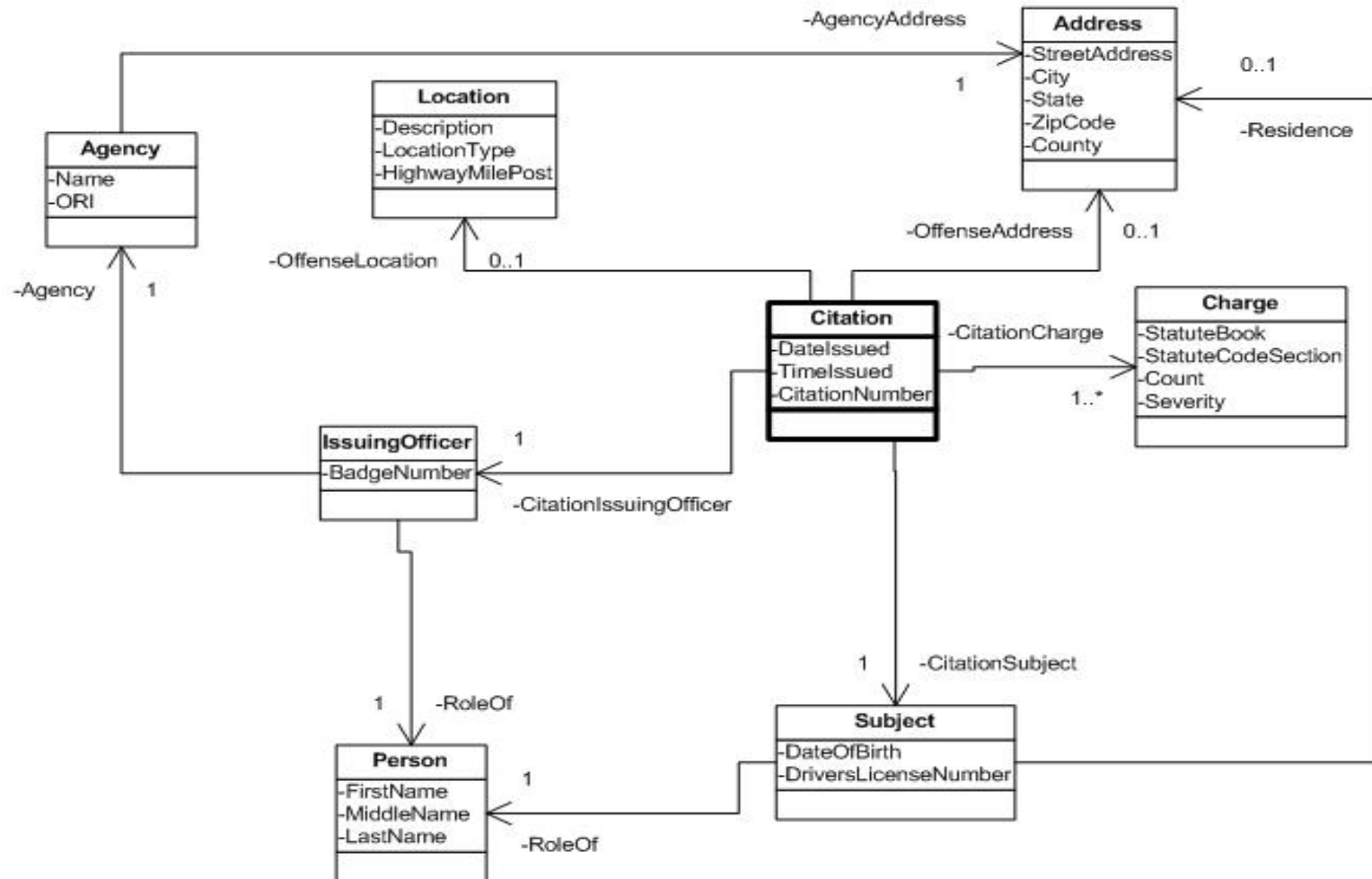
Case Study

CITATION ISSUANCE EXCHANGE MODEL



Case Study Solution

CITATION ISSUANCE EXCHANGE MODEL



Module Summary

- After completing this module, you should be able to:
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 - ◆ Recognize how to apply business skills to the modeling process.
 - ◆ Leverage proper modeling techniques.
 - ◆ Develop an exchange content model using UML.

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